DATE: 22 April 2016

TO: Liaison Coordinator, 3GPP

        Requested distribution to:
        3GPP TSG RAN4 Chair – Xutao Zhou
        3GPP TSG RAN Chair – Dino Flore
        Secretary of RAN – Joern Krause

FROM: Wi-Fi Alliance

RE: Wi-Fi Alliance comments on "Way forward on coexistence tests for LAA"

Dear Liaison Coordinator,

Wi-Fi Alliance requests that the attached memorandum be distributed to the Chair of the working groups listed above, in regards to LTE-LAA coexistence.

Best Regards,

Tina Hanzlik
Wi-Fi Alliance Staff

DATE: 22 April 2016

TO: Xutao Zhou, 3GPP TSG RAN4 Chair, xutao.zhou@samsung.com
         Dino Flore, 3GPP TSG RAN Chair, oflore@qti.qualcomm.com

CC: Joern Krause, Secretary of RAN, Joern.Krause@ETSI.ORG

RE: Wi-Fi Alliance comments on "Way forward on coexistence tests for LAA"

Dear Xutao and Dino,

Wi-Fi Alliance would like to thank 3GPP for its liaison document RP-152234 together with the enclosure "Way forward on coexistence tests for LAA" R4-158436 and for its proactive engagement with Wi-Fi Alliance on issues relating to coexistence between LAA and Wi-Fi.

Wi-Fi Alliance is developing methods to characterize how unlicensed LTE devices and Wi-Fi devices share unlicensed spectrum in a broad range of environments. We believe this project is a good complement to the efforts within 3GPP to assure the industry that 3GPP's proposed LTE-LAA technology behaves in a manner that is fair to other unlicensed spectrum users, such as Wi-Fi.

Wi-Fi Alliance offers a number of comments with the aim of aiding and supporting R4-158436 and advancing the effectiveness of the coexistence testing.

We look forward to your response and continued cooperation between our organizations.

Sincerely,

Wi-Fi Alliance

Wi-Fi Alliance Comments on "Way forward on coexistence tests for LAA" R4-158436

Wi-Fi Alliance agrees with the general spirit of the presentation insofar as the fundamental aspects of implemented listen-before-talk (LBT) algorithm should be tested. However Wi-Fi Alliance believes that testing only the LBT algorithm may not be sufficient to determine overall fair coexistence given the complex nature of LTE-LAA.

As an example, in recent LTE-LAA simulations we observed concerning results in certain scenarios. In particular, we draw your attention to R1-156621 where the results found with FTP Model 1 over TCP showed that the throughput of both the Wi-Fi and the LTE-LAA systems is significantly reduced to ~20% or less of the baseline. A small team of experts, in consultation with a few LTE vendors, have investigated the simulation model to understand the results better. This team has not found errors or inaccuracies in the simulation and we have communicated these findings with RAN 1.

Wi-Fi Alliance defines fair sharing as "A deployed system transmitting in an unlicensed channel is operating fairly to Wi-Fi if the impact of that system on Wi-Fi users in the channel is no worse than the impact that would result from an additional Wi-Fi device or Wi-Fi network introduced into the channel supporting the same traffic load as the system.
A technology capable of being used in unlicensed channels is fair to Wi-Fi if its deployed implementations will always operate fairly as described above."

In the example above the conditions required to declare fair sharing would not have been met.

Wi-Fi Alliance is currently engaged with unlicensed LTE stakeholders in a program to deliver a coexistence test plan that will be validated by stakeholders using practical testing. This test plan is currently in ALPHA release and is available to the public at Draft Coexistence Test Plan (v0.8.4 - March 2016). We encourage 3GPP to consider that work as may be applicable to the RAN4 LTE-LAA test project.

The Wi-Fi Alliance LTE-LAA coexistence test plan will contain a number of different scenarios where Wi-Fi and LTE-LAA devices interact so that coexistence behavior can be measured under different circumstances. Wi-Fi Alliance also believes that the best form of coexistence is avoidance of channels where other activity is present if that is possible. To this end the Wi-Fi Alliance coexistence test plan contains procedures that test for the ability of the device under test to choose vacant, or least loaded, channels where possible.

Noting that the RAN4 Way Forward uses a signal generator to test out the Listen Before Talk aspects of LAA, and noting that some manufacturers are increasingly likely to incorporate algorithms that can detect the presence of Wi-Fi signals at lower levels than simple energy detection, Wi-Fi Alliance requests that RAN4 consider using a Wi-Fi like signal as the

interferer. Wi-Fi Alliance would welcome the opportunity to collaborate with RAN4 in designing a suitable signal.

While Wi-Fi Alliance agrees with RAN4's desire to test the LBT mechanism for compliance, Wi-Fi Alliance maintains that ensuring compliance of the LBT aspects to the standard is not sufficient to ensure that fair sharing of the medium will occur when the system is deployed.

Our conclusion is that coexistence testing must examine the way in which the LTE-LAA system behaves and interacts with other devices on the channel in normal operation such as a TCP file download or VOIP scenarios and ensure that it is sharing the channel fairly.